

**Appendix 2. Monitoring of insect protected *Bt* maize MON 810 in Europe –  
Implementation of *Bt* maize specific measures**

# Monitoring of insect protected *Bt* maize MON 810<sup>1</sup> in Europe - Implementation of *Bt*-maize specific measures

Report on the 2013 growing season

## Responsibilities:

### Data management and statistical analysis:

BioMath GmbH  
Schnickmannstraße 4  
D - 18055 Rostock  
Germany

### Sponsor:

Monsanto Europe S.A.  
Avenue de Tervuren 270-272  
B - 1150 Brussels  
Belgium

2014-08-28

©2014 Monsanto Company. All Rights Reserved.

This document is protected under national and international copyright law and treaties. This document and any accompanying material are for use only by the regulatory authority to which it has been submitted by Monsanto Company and only in support of actions requested by Monsanto Company. Any other use, copying, or transmission, including internet posting, of this document and the materials described in or accompanying this document, without prior consent of Monsanto, is strictly prohibited; except that Monsanto hereby grants such consent to the regulatory authority where required under applicable law or regulation. The intellectual property, information and materials described in or accompanying this document are owned by Monsanto Company, which has filed for or been granted patents on those materials. By submitting this document and any accompanying materials, Monsanto does not grant any party or entity any right or license to the information, material or intellectual property described or contained in this document.

---

<sup>1</sup> The commercial name for MON 810 being YieldGard<sup>®</sup> corn borer maize. YieldGard<sup>®</sup> corn borer is a registered trademark of Monsanto Technology LLC.

# Contents

- List of tables .....2
- 1 Introduction .....3
- 2 Methodology.....4
  - 2.1 Survey .....4
    - Coding of personal data .....5
    - Training of the interviewers .....5
  - 2.2 Statistical procedure .....6
  - 2.3 Data management and quality control .....6
- 3 Results and discussion .....7
  - 3.1 Information on good agricultural practices on MON 810.....7
  - 3.2 Seed.....7
  - 3.3 Prevention of insect resistance.....8
- Bibliography .....9
- A Tables of free entries .....10

# List of tables

Table 1: Information on good agricultural practices in 2013 .....7

Table 2: Evaluation of training sessions in 2013 .....7

Table 3: Compliance with label recommendations in 2013.....8

Table 4: Plant refuge in 2013 .....8

Table 5: Refuge implementation per country in 2013 .....8

  

Table A 1: Motivations for not complying with the label recommendations (section 3.2) .....10

Table A 2: Motivations for not planting a refuge (section 3.3).....11

# 1 Introduction

The monitoring of MON 810 cultivation in the EU is regulated by Commission Decision 98/294/EC [OJEC, 1998] and is focused around the implementation of and reporting on a management strategy in order to minimise the likelihood for the development of insect resistance. Although the current report does not provide the analysis of the insect susceptibility to the Cry1Ab protein per se, it does assess the compliance of seed companies and farmers with the requirements to prevent insect resistance to occur. To this effect, Monsanto has set up farmer surveys. This report presents the outcomes of the statistical analysis of data on Bt maize specific measures collected through these surveys in European MON 810 cultivating countries during the 2013 growing season.

According to the *Harmonised insect resistance management (IRM) plan for cultivation of Bt maize (single insecticidal traits) in the EU* from EuropaBio (2012), farmers planting more than five hectares of MON 810 must have a refuge area planted with maize that does not express Cry1Ab and that corresponds to at least 20% of the surface planted with MON 810. Seed companies, at the other hand, have committed to appropriately label seed bags and provide technical guides on how to appropriately use the technology.

Upon approval of MON 810 (Commission Decision 98/294/EC [OJEC, 1998]), Monsanto has established a management strategy in order to minimize the development of insect resistance and offered to inform the Commission and/or the Competent Authorities of the results. To monitor the compliance of both seed companies and MON 810 cultivating farmers to the implementation of insect resistance measures Monsanto carried out a survey after the 2013 growing season.

The objective of this report is to present the results of the analysis of that survey.

## 2 Methodology

### 2.1 Survey

To check if farmers and seed companies are in compliance with the MON 810 cultivation recommendations, Monsanto asked the farmers three questions (Figure 1).

2	0	1	3	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1
Year				-	Event		-	Partner			-	Country		-Interviewer-			Farmer		-	Area		

Implementation of Bt-maize specific measures
<p><b>1. Have you been informed on good agricultural practices for YieldGard® maize?</b></p> <p><input type="radio"/> Yes      <input type="radio"/> No</p> <p>Only if you answered "Yes", would you evaluate these technical sessions as:</p> <p><input type="radio"/> Very useful      <input type="radio"/> Useful      <input type="radio"/> Not useful</p>
<p><b>2. Seed</b></p> <p>Was the seed bag labelled with accompanying specific documentation indicating that the product is genetically modified maize YieldGard® maize?</p> <p><input type="radio"/> Yes      <input type="radio"/> No</p> <p>Did you comply with the label recommendations on seed bags?</p> <p><input type="radio"/> Yes</p> <p><input type="radio"/> No, because: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p><b>3. Prevention of insect resistance</b></p> <p>Did you plant a refuge in accordance to the technical guidelines?</p> <p><input type="radio"/> Yes</p> <p><input type="radio"/> No, because the surface of YieldGard® maize planted on the farm is &lt; 5 ha</p> <p><input type="radio"/> No, because _____</p> <p>_____</p> <p>_____</p> <p>_____</p>

Figure 1: Survey - Implementation of Bt-maize specific measures

### Coding of personal data

For confidentiality reasons and for identification, each farmer was assigned a unique code where personal data were coded according to the following format:

2	0	1	3	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1
Year				Event Code		Partner Code			Country Code			Interviewer Code		Farmer Code		Area Code						

### Codes:

Event: 01 MON 810

02 ...

Partner: MON Monsanto

MAR Markin

AGR Agro.Ges

... ..

Country: ESSpain

PT Portugal

RO Romania

... ..

Interviewer: 01 A

02 B

03 ...

Farmer: incremental counter within the interviewer

Area: incremental counter within the farmer

(e.g. 2013-01-MAR-ES-01-01-01). The data were stored and handled in accordance with the Data Protection Directive 95/46/EC [OJEC, 1995]. This is in order to ensure an honest response and to avoid competitive intelligence.

### Training of the interviewers

To assist the interviewers in performing the survey with the farmers, a 'user's manual' was developed. While questions have been carefully phrased to obtain accurate observations from farmers, previous experience with the survey may increase awareness.

Additionally, like in previous years, all interviewers have been trained to understand the background of the questions. Here also experience gained during previous years surveys (uncertainties, misinterpretation of questions) could be shared.

## 2.2 Statistical procedure

To assess the implementation of Bt maize specific measures a descriptive analysis was performed as follows:

The frequencies of the farmer responses for the different categories were calculated. The calculation of frequencies and their percentages was done both on the basis of all and on the basis of valid answers. When farmers gave no statement, these answers were accounted missing values and therefore not considered valid. As a consequence, the "valid percentages" state the proportions of the several categories of an answer that are really known, whereas the "percentages" only specify the proportions of the categories within the whole answer spectrum, including no answers. Additionally, the accumulated valid percentages were calculated for illustrating the distribution function and for quality control reasons.

## 2.3 Data management and quality control

A database was developed for data management and storage. For each question a variable was defined by a variable name (eight-digit in maximum) and a variable label (short description of the question). The variables were specified according to their type (qualitative or string), format etc. Missing values were defined (-1: no statement, -2: not readable). For not readable entries, queries were formulated and the field representatives or farmers were asked for clarification. These entries in the database were corrected. For qualitative variables the possible parameter values were defined and coded (and only the coded values taken).

High quality of the data was assured by training the interviewers initially in a workshop and for refreshment yearly by phone. In face-to-face interviews, the interviewers are instructed to check whether the farmer's answer corresponds to their documentation. When surveys are performed by phone, the farmers get the questions about two weeks in advance to pick up the information from their documentation.

All data were entered and controlled for their quality. A quality control check first checks the completeness of the data. The 'Yes/ No' data fields and explanations on case of 'No' answers on question 2 and 3 are defined to be obligatory, therefore missing values or unreadable entries are not accepted. Furthermore the values are checked for correctness (qualitative values - e.g. Yes/ No - meeting only acceptable parameter values - e.g. 1/0).

For any missing or implausible data the interviewers were asked to contact the farmers again to complete or correct the answers (interviewers got written queries from BioMath).



### 3 Results and discussion

#### 3.1 Information on good agricultural practices on MON 810

98.4 % (252/256) of the farmers reported to have been informed about the good agricultural practices applicable to MON 810 (Table 1).

95.6 % (241/256) of the farmers considered the training sessions to be either *useful* or *very useful* (Table 2). This information indicates that the great majority of the farmers had been exposed to a valuable training concerning MON 810.

Table 1: Information on good agricultural practices in 2013

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	252	98.4	98.4	98.4
	no	4	1.6	1.6	100.0
Total		256.0	100.0	100.0	

Table 2: Evaluation of training sessions in 2013

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	very useful	72	28.1	28.6	28.6
	useful	169	66.0	67.1	95.6
	not useful	11	4.3	4.4	100.0
	Total	252	98.4	100.0	
Missing	No statement	4	1.6		
Total		256.0	100.0		

#### 3.2 Seed

The question "was the bag labeled with accompanying documentation indicating that the product is genetically modified maize MON 810" was answered with *yes* in all cases. This indicated that the bags were labeled appropriately and that the label and the accompanying documentation were clear to the farmers.

The great majority of the farmers (91.4 %) reported that they are following the label recommendations on the seed bags (Table 3). 22 farmers (8.6 %) from Spain admitted that they did not follow the label recommendation, in the most cases they didn't plant a refuge. Deviations from the label recommendations are listed in Appendix A, Table A 1.

Table 3: Compliance with label recommendations in 2013

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	234	91.4	91.4	91.4
	no	22	8.6	8.6	100.0
Total		256	100.0	100.0	

### 3.3 Prevention of insect resistance

While 5.9 % (15/256) of the farmers did not plant a refuge because they had less than 5 ha of maize in the farm (the Insect Resistance Management Plan states that no refuge is required if less than 5 hectares are planted), 85.5 % (219/256) did plant a refuge (Table 4). 8.6 % (22/256) of the farmers reported that they did not plant a refuge.

So 91.4 % (234/256) of the farmers did follow the label recommendations, which corresponds to the 91.4 % (234/256) of all farmers claiming to be compliant with them (Table 3).

Table 4: Plant refuge in 2013

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	219	85.5	85.5	85.5
	no, because the surface of Bt maize is < 5 ha	15	5.9	5.9	91.4
	no	22	8.6	8.6	100.0
Total		256	100.0	100.0	

In Spain in 2013, among the farmers who were required to plant a refuge (i.e. farm growing more than 5 ha of maize), 87.4 % of them (153/175) did it (Table 5).

Table 5: Refuge implementation per country in 2013

	Country	Refuge implementation			
		Yes	No, because the surface of Bt maize is < 5 ha	No	Total
Valid	Spain	153	15	22	190
	Portugal	46	0	0	46
	Czech Republic	18	0	0	18
	Romania	2	0	0	2
Total		219	15	22	256

Due to the continuous and intensive training of farmers about implementing a refuge the all over compliance this year is on a high level. In Spain 12.5 % (22/175) of the farmers, who were required to, did not plant a refuge. The farmers gave mainly two reasons for not planting a refuge. The first is that the farmer had no or not enough information about the technical guidelines (4/22, 18.2 %), the second is that the sowing is complicate by planting a refuge (18/22, 81.8 %). All individual reasons for not planting a refuge are listed in Appendix A, Table A 2.

## Bibliography

[OJEC, 1995] Official Journal of the European Communities, 23 November 1995: *Directive 95/46/EC of the European Parliament and of the Council of 24 Oktober 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data*. L 281/31.

[OJEC, 1998] Official Journal of the European Communities, 05 May 1998: *Commission Decision of 22 April 1998 concerning the placing on the market of genetically modified maize (Zea mays L. line MON 810), pursuant to Council Directive 90/220/EEC*. L 131/32.

## A Tables of free entries

Table A 1: Motivations for not complying with the label recommendations (section 3.2)

Country	Quest. Nr.	Compliance	Reasons
Spain	3911	no	I did not plant a refuge
Spain	3972	no	I did not plant a refuge because it complicates the sowing.
Spain	4003	no	It is complicated to plant a refuge.
Spain	4005	no	I did not plant a refuge
Spain	4008	no	I did not plant a refuge
Spain	4013	no	I did not plant a refuge
Spain	4016	no	I did not plant a refuge because it is very inconvenient.
Spain	4018	no	I did not plant a refuge because nobody do it.
Spain	4019	no	I did not read the label recommendations.
Spain	4020	no	I did not plant a refuge because nobody do it.
Spain	4021	no	I did not have enough time to plant a refuge.
Spain	4022	no	I did not plant a refuge
Spain	4023	no	I did not plant a refuge
Spain	4024	no	I did not plant a refuge
Spain	4026	no	I did not plant a refuge
Spain	4027	no	I did not plant a refuge
Spain	4028	no	I did not read the label recommendations.
Spain	4029	no	I did not plant a refuge because it complicates the sowing.
Spain	4034	no	I did not plant a refuge
Spain	4035	no	I did not read the label recommendations.
Spain	4037	no	I did not read the label recommendations.
Spain	4040	no	I did not plant a refuge

Table A 2: Motivations for not planting a refuge (section 3.3)

Country	Quest. Nr.	Plant refuge?	Reasons
Spain	3911	no	It complicates the sowing
Spain	3972	no	It complicates the sowing
Spain	4003	no	It is very complicated, it is difficult to follow the technical guidelines.
Spain	4005	no	It complicates the sowing
Spain	4008	no	I sow small surface and it complicates the sowing.
Spain	4013	no	I have a small field, I sow a small surface.
Spain	4016	no	It is very inconvenient when I have to sow.
Spain	4018	no	None of my neighbours sowing YieldGard maize plant a refuge.
Spain	4019	no	I'm not informed about refuges because I did not read the label recommendations.
Spain	4020	no	Because nobody sow refuges and all ECB insects will come to my refuge.
Spain	4021	no	I have very short time to sow and to plant a refuge is a complication.
Spain	4022	no	I have short time to sow and it complicates the sowing.
Spain	4023	no	It complicates the sowing, I sow a small surface and nobody plant a refuge.
Spain	4024	no	I don't see necessary to plant a refuge, it is inconvenient.
Spain	4026	no	I sow a small surface of YieldGard maize and it complicates the sowing.
Spain	4027	no	I sow a small surface and if I would plant refuge I could have big yield losses by ECB attack.
Spain	4028	no	I'm not informed about refuges because I did not read the label recommendations.
Spain	4029	no	I have short time to sow maize and to plant a refuge is a complication.
Spain	4034	no	I sow a small surface and it complicates the sowing.
Spain	4035	no	I don't know the technical guidelines, I'm not informed.
Spain	4037	no	I'm not informed, I don't know the technical guidelines.
Spain	4040	no	It complicates the sowing